

Appl. No. 10/518,133
Amdt. dated June 13, 2006
Reply to Office action of December 13, 2005

In the Claims:

Claims are 1-6, 8-13, 15 and 16 amended herein. New claims 17-22 are added. The remaining claims are not amended in this response.

1. (currently amended) A method of producing a multiple band-type antenna, comprising:

a first step in which a connector is formed by forming threads on an outer surface of a cylindrical metallic rod having a certain length and a certain diameter, and a hollow processed portion is formed in an upper part of the metallic rod;

a second step in which a connection member is formed between the hollow processed portion and the connector in such a manner that a certain space has an impedance transformer at a portion near a processed portion formed as a center passes through and near the connector the connection member connects the hollow processed portion and the connector has a space functioning as an impedance transformer;

a third step in which a spiral first helical antenna is formed from an end of the connection member distanced by a certain interval from the space formed in the connection member on the hollow processed portion;

a fourth step in which a dielectric is provided to surround the connection member in such a manner that said dielectric is

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~~exposed from the portions that the connection member that is inserted into an inner side of the first helical antenna formed in the third step, has a passed through center and a certain space, and the first helical antenna are getting started to be formed and to support the first helical antenna; and~~

a fifth step in which a covering member is insert-molded on an outer surface of the first helical antenna.

2. (currently amended) The method of claim 1, wherein ~~in a process that the third step is performed after the second step, said the second step is performed after the third step is performed.~~

3. (currently amended) The method of claim 1, further comprising a step in which a second helical antenna is installed at an inner side of the dielectric formed in the fourth step ~~before the covering member is insert-molded first helical antenna before the fifth step.~~

4. (currently amended) ~~The method of claim 3, A method of producing a multiple band-type antenna, comprising:~~
~~a first step in which a connector is formed by forming threads on an outer surface of a cylindrical metallic rod having a certain length and a certain diameter;~~

~~a second step in which a connection member is formed in such a manner that a certain space has an impedance transformer at a~~

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portion near a processed portion formed as a center passes
through and near the connector;

a third step in which a spiral first helical antenna is
formed from an end of the connection member distanced by a
certain interval from the space formed in the connection member;

a fourth step in which a dielectric is provided to surround
the connection member in such a manner that said dielectric is
exposed from the portions that the connection member that is
inserted into an inner side of the first helical antenna formed
in the third step, has a passed-through center and a certain
space, and the first helical antenna are getting started to be
formed; and

a fifth step in which a covering member is insert-molded on
an outer surface of the first helical antenna,

further comprising a step in which a second helical antenna
is installed at an inner side of the dielectric formed in the
fourth step before the covering member is insert-molded, and

further comprising a step in which a whip antenna passing
through a center is installed after the second helical antenna is
installed, and the covering member is insert-molded.

5. (currently amended) ~~The method of claim 3,~~ A method of
producing a multiple band-type antenna, comprising:

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a first step in which a connector is formed by forming
threads on an outer surface of a cylindrical metallic rod having
a certain length and a certain diameter;

a second step in which a connection member is formed in such
a manner that a certain space has an impedance transformer at a
portion near a processed portion formed as a center passes
through and near the connector;

a third step in which a spiral first helical antenna is
formed from an end of the connection member distanced by a
certain interval from the space formed in the connection member;

a fourth step in which a dielectric is provided to surround
the connection member in such a manner that said dielectric is
exposed from the portions that the connection member that is
inserted into an inner side of the first helical antenna formed
in the third step, has a passed-through center and a certain
space, and the first helical antenna are getting started to be
formed; and

a fifth step in which a covering member is insert-molded on
an outer surface of the first helical antenna,

further comprising a step in which a second helical antenna
is installed at an inner side of the dielectric formed in the
fourth step before the covering member is insert-molded,

wherein a dielectric is coated on an outer surface of the
second helical antenna installed at an inner side of the first
helical antenna.

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6. (currently amended) The method of claim 1, A method of producing a multiple band-type antenna, comprising:

a first step in which a connector is formed by forming threads on an outer surface of a cylindrical metallic rod having a certain length and a certain diameter;

a second step in which a connection member is formed in such a manner that a certain space has an impedance transformer at a portion near a processed portion formed as a center passes through and near the connector;

a third step in which a spiral first helical antenna is formed from an end of the connection member distanced by a certain interval from the space formed in the connection member;

a fourth step in which a dielectric is provided to surround the connection member in such a manner that said dielectric is exposed from the portions that the connection member that is inserted into an inner side of the first helical antenna formed in the third step, has a passed-through center and a certain space, and the first helical antenna are getting started to be formed; and

a fifth step in which a covering member is insert-molded on an outer surface of the first helical antenna,

further comprising a step in which a whip antenna is installed at an assembly formed after the covering member is insert-molded.

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7. (original) The method of claim 6, further comprising a third helical antenna installed at an end of one side of the whip antenna.

8. (currently amended) The method of claim 1, wherein said the covering member formed by the insert molding method is formed in a shape of a cap.

9. (currently amended) The method of claim 1, wherein an available frequency range is adjusted by adjusting the size of a the space.

10. (currently amended) A multiple bands type antenna, comprising:

a connector having threads on its outer surface;
a circular plate formed on an upper surface of the connector;

~~a connection member that is formed on one end of which is connected to an upper surface of the circular plate and has a space forming an impedance transformer;~~

~~a first helical antenna formed at an the other end of the connection member wherein said first helical antenna is integrally formed based on a cutting process of a cylindrical metallic rod;~~

~~a dielectric having a center passing an inner side of the first helical antenna and supporting an inner side of the first~~

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helical antenna and surrounding an outer side of the connection member; and

a covering member insert-molded on an outer surface of the first helical antenna,

wherein the connection member forms a space between the first helical antenna and the circular plate while electrically connecting the first helical antenna and the circular plate.

11. (currently amended) The antenna of claim 10, further comprising a second helical antenna that has one end connected with the circular plate and ~~a free~~ the other end ~~formed at the~~ ~~other end of the same~~ of which is a free end and is installed at an inner side of the dielectric first helical antenna.

12. (currently amended) The antenna of claim 11, A
multiple bands type antenna, comprising:

a connector having threads on its outer surface;
a circular plate formed on an upper surface of the connector;

a connection member that is formed on an upper surface of the circular plate and has a space forming an impedance transformer;

a first helical antenna formed at an end of the connection member wherein said first helical antenna is integrally formed
based on a cutting process of a cylindrical metallic rod; and

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a dielectric having a center passing an inner side of the
first helical antenna and an outer side of the connection member;
and a covering member insert-molded on an outer surface of the
first helical antenna,

further comprising a second helical antenna that has one end
connected with the circular plate and a free end formed at the
other end of the same and is installed at an inner side of the
dielectric, and

 further comprising a whip antenna that passes through a
center portion after the second helical antenna is installed, and
the covering member is insert-molded.

13. (currently amended) The antenna of claim 10, further
comprising a whip antenna that passes through ~~a center after the~~
~~covering member is insert-molded~~ the first helical antenna.

14. (original) The antenna of claim 12, further comprising
a third helical antenna formed at an end of one side of the whip
antenna.

15. (currently amended) The antenna of claim ~~10~~ 11,
wherein a coating layer formed of a dielectric is formed on an
outer surface of the second helical antenna ~~installed at an inner~~
~~side of the first helical antenna.~~

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16. (currently amended) The antenna of claim 10, wherein said the first helical antenna has a cross section of a plate shape.

17. (new) The method of claim 3, further comprising a step in which a whip antenna passing through the second helical antenna is installed after the fifth step.

18. (new) The method of claim 3, wherein a dielectric is coated on an outer surface of the second helical antenna installed at an inner side of the first helical antenna.

19. (new) The method of claim 1, further comprising a step in which a whip antenna is installed to pass through the first helical antenna after the fifth step..

20. (new) The method of claim 19, wherein a third helical antenna is installed at an end of the whip antenna.

21. (new) The antenna of claim 11, further comprising a whip antenna that passes through the second helical antenna.

22. (new) The antenna of claim 21, further comprising a third helical antenna formed at an end of the whip antenna.